Editorial

This week's survey results show that Geographic Information Systems (GIS) applications in transportation are varied and useful. Applications range from asset management to travel demand forecasting to transit route analysis. Most agencies use advanced data collection techniques such as GPS to collect data for their GIS applications, update their databases as necessary, and have either achieved interoperability or are working on achieving it.

However, there is one aspect of GIS applications in transportation (GIS-T) that the survey results highlight as a serious problem. Nearly 80% of respondents from MPOs and transit agencies believe that there is a shortage of GIS-T specialists. This could hamper the progress that GIS-T is making in transportation applications. A quick look at the National Highway Institute and National Transit Institute course catalogs show not one GIS-T course presently on offer. Even at the undergraduate level, many collegiate programs are struggling with how to accommodate a course on spatial data and analysis in urban planning and civil engineering. Some civil engineering schools only require an introductory surveying course, as concluded by Wayne Sarasua of Clemson University in a recent paper given at this year's Transportation Research Board meeting entitled "Addressing Educational Needs in Spatial Data and Information Science within the Civil Engineering Undergraduate Curriculum." Some schools have abandoned surveying and related courses, according to Sarasua.

It seems entirely understandable, therefore, why so many respondents indicate that there is a shortage of GIS-T specialists. Considering that this is a fast-developing field and that the number of applications of GIS-T is growing, especially in the transportation simulation field, it seems difficult to understand why educational opportunities, and particularly continuing educational opportunities, appear so limited. Hopefully, some enterprising entity will see this limitation as an opportunity!

Daniel B. Rathbone, Ph.D., P.E.
Editor/Publisher

This Week's Survey Results

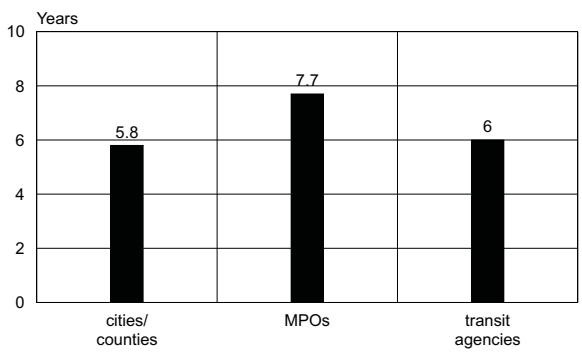
GIS in Transportation

Last month, *The Urban Transportation Monitor* sent survey questionnaires to transportation professionals (traffic engineers, transportation planners and transit professionals at cities, counties, Metropolitan Planning Organizations, and at transit agencies) to obtain information and opinions on the use of Geographic Information Systems (GIS) in Transportation (commonly referred to as GIS-T). Surveys were sent to 650 transportation professionals in the U.S. and Canada. Altogether 110 replies were received for a response rate of 17%. The results of the survey are published here.

Characteristics of respondents

Percentage of respondents who work for cities and counties: 50%
Percentage of respondents who work for MPOs: 21%
Percentage of respondents who work for transit agencies: 29%
Altogether, 90% of the respondents have a GIS system in operation

How many years has your GIS system been in operation?



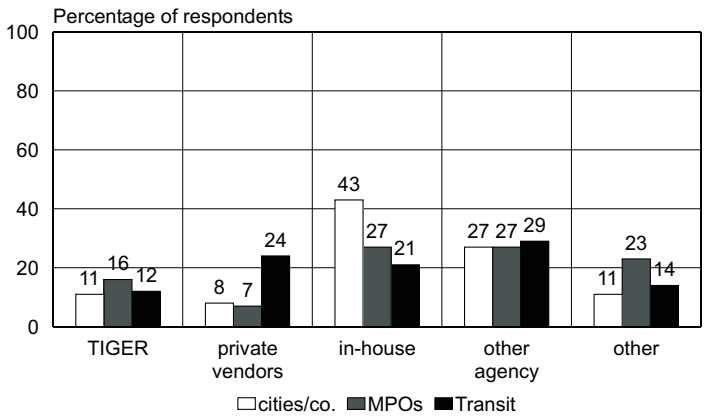
Which GIS software are you using or planning to use? (Answers are in order of frequency provided by respondents)

Cities/Counties
- ArcView
- ArcGIS
- ArcInfo
- ArcMap
- AutoCad Map
- MapGuide
- Geomedia
- MapInfo

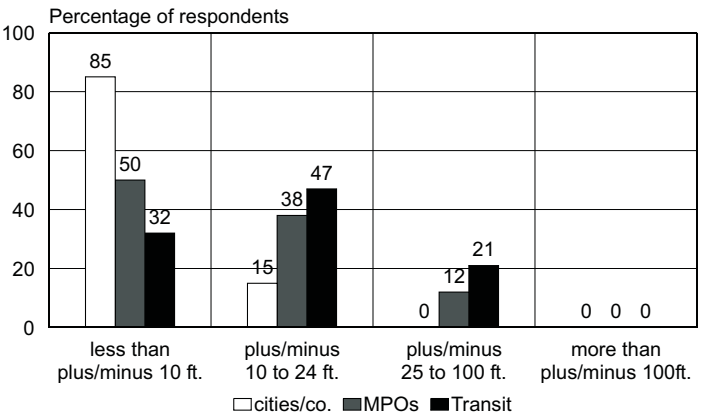
MPOs
- ArcView
- TransCAD
- ArcInfo
- ArcGIS
- MapInfo

Transit Agencies
- ArcView
- ArcGIS
- MapInfo
- ArcIMS

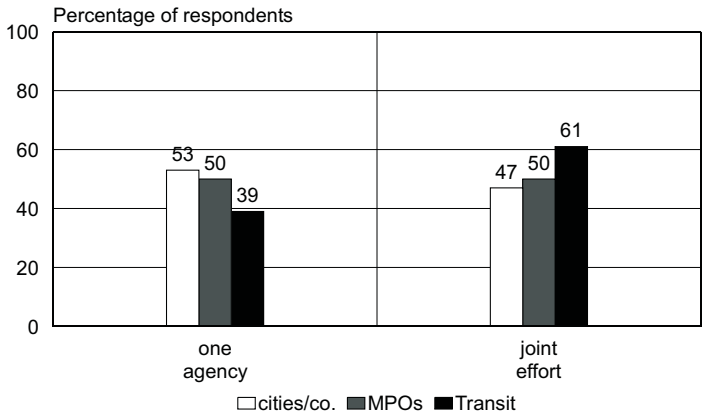
What is the source(s) of your GIS base map?



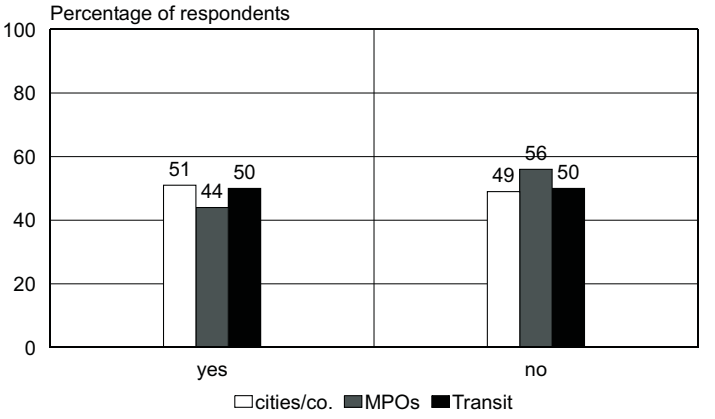
What is the location accuracy required of your database for applications?



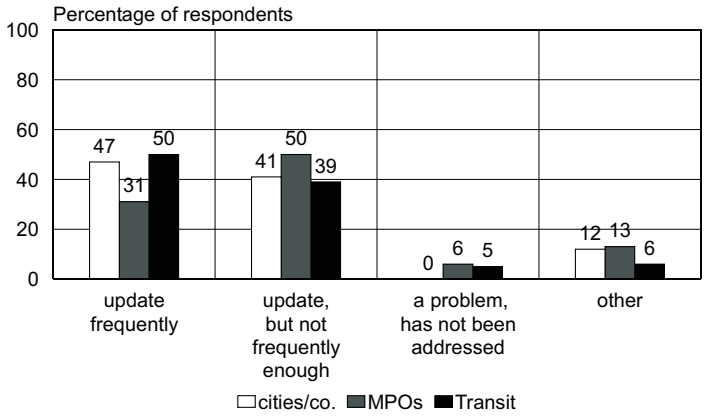
Was your GIS base map developed by one agency, or was it a joint effort between different agencies in your region?



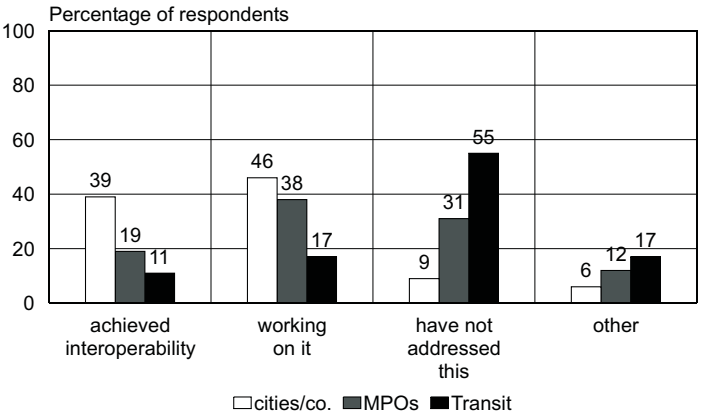
Do you have a centralized "data unit" in charge of all data collection for your region's GIS system?



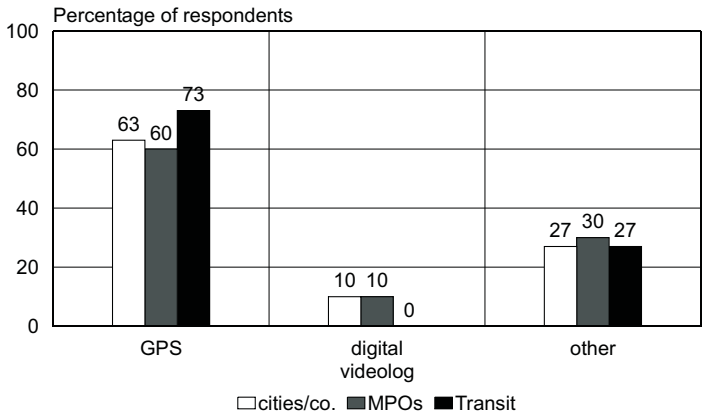
To what degree are you maintaining your GIS data to keep current, accurate data?



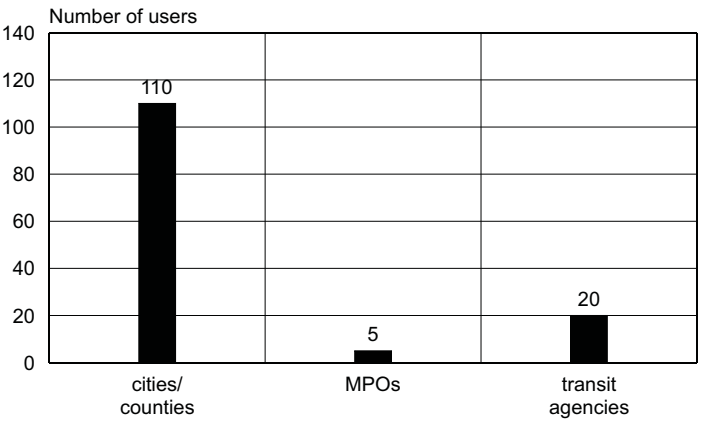
To what degree have you achieved GIS interoperability at your agency?



What "advanced" data collection technologies have/are you using?



How many users can use your GIS system simultaneously?



Approximately how much resources in terms of staff time and consultant contracts have you already and/or are you planning to use to reach an operational GIS system for transportation purposes? (Note: staff time was monetized as follows: professional person month = $10,000; non-professional person month = $5,000)

Replies from respondents at Cities/Counties:

Average: $238,000
Highest amount: $680,000
Lowest amount: $25,000

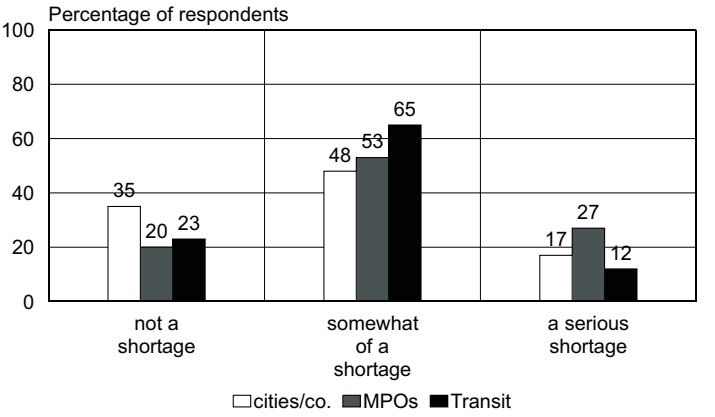
Replies from respondents at MPOs:

Average: $514,000
Highest amount: $2,000,000
Lowest amount: $70,000

Replies from respondents at Transit Agencies:

Average: $370,000
Highest amount: $1,370,000
Lowest amount: $25,000

Do you believe there is a shortage of GIS-T specialists in the U.S.?



What web-enabled applications of GIS-T has your agency applied to date?(Answers are provided in no particular order since similar answers were not obtained therefore not grouped together. As a result it was not possible to rank answers according to frequency provided.)

Cities/Counties

Will be using web-GIS for transit ITS projects.
Establishing mileage reimbursement maps.
Currently we have road jurisdiction, subdivision, and zoning maps on-line.
Transit routes, transit stops and amenities.
In-house accident data.
PMS data, sign inventory, maintenance schedules.
Street names, block numbers, addressing.
Displaying data (maps) to staff using Adobe Acrobat on the Web.
Built a traffic calming application for managing traffic circles, speed humps, and corner bulges using MapGuide and Cold Fusion.

MPOs

Map of our region with links to member counties and cities.
On-line transit trip planning application (www.transitinfo.org).
Transportation Improvement Program (TIP) mapping and analysis web application.
On-line travel survey for travel demand forecasting.
Transportation Improvement Project map service for public information and comment.
Interactive mapping for transit route queries by the public.
Presentation of major agency documents.
Presentation of agency transit, and street and highway projects.

Transit

Web interactive map.
Some reporting for safety and security tracking systems.
Plan to make our data layers available on the web.
Plan to develop an application to assist local businesses on the collection of our local sales and use tax.
Real estate asset management intranet application.
Intranet GIS data server displays: routes, stops, schedules, real-time bus locations, streets, orthophotography, park-n-rides, districts, basemap.

Thus far, what is considered to be the most useful/most important application(s) of your GIS system? (Answers are listed in order of frequency provided)

Cities

Parcel creation and maintenance, parcel/subdivision lines/mapping, assessors' maps.

Asset management/inventory tracking, including land use inventorying and planning, traffic signal system assets, location of traffic signals.

Provides access to spatial information 24 hours per day for Realtors, Banks, Engineers, Architects.

Traffic data, accident data management system.

Aerial photos and parcels.

Access to information related to transportation infrastructure.

Quick and graphical access to data.

Tracking of transit vehicles.

Location information for emergency needs.

Analysis of new developments.

Street centerline/geo-referencing.

Spatial analysis.

Transportation planning, system cost estimating.

Demographic distributions, behavioral statistics.

Creating documents for reports, grant proposals and presentations.

Project planning and work scheduling.

MPOs

Use as a mapping tool (for presentations as well) and an analysis tool.

Travel demand forecasting model.

Land use planning, zoning maps.

Linear referencing, spatial analysis and routing.

Digital aerial imagery.

Cartographic display of travel demand model results.

Scheduling and mapping rides for paratransit service.

Doing a zoning-based impervious surfaces buildout analysis to show the effect on local basins.

Buffer analysis for transit route purposes.

Transit

Analysis and planning of routes and stops, including market analysis, demographic analysis.

Automatic Passenger Counting.

A base system map / route map for public outreach efforts.

Automatic Vehicle Location tracking.

Title VI Profiling and reporting, including ridership trends, demographic trends, etc.

Calculation of route miles.

Paratransit trip analysis.

Planning tool for the city's neighborhood planning projects.

Automated ridematching and trip (itinerary) planning.

Use for telephone information system.

GeoVan, which enables staff making client site visits to geocode the home addresses of potential vanpool participants during the client visit. Staff can then discuss, preliminarily, the potential number of vanpool groups with the client on the initial visit, reducing response time from two weeks to half an hour.

GIS-based intelligent bus system: dispatchers have real-time information on the location of the buses, improving the accuracy and usability of automatic passenger counters and on-time performance, routes can be optimized, running times will be more accurately known, and overall system performance will improve.

What factor(s) do you consider to be key to the successful implementation of a GIS system at a transportation agency? (Answers are listed in order of frequency provided by consultants)

Cities

Regular updates of data, (including street centerline data) and regular maintenance of system, ease of maintenance.

Buy-in by senior and mid level managers.

Interoperability.

Training staff to embrace GIS, education of staff to determine GIS role in the organization.

Good data, solid base map.

Know what products you want. What is the question you want to answer.

A "team" with strong transportation, data gathering and GIS capabilities.

Team effort of County, City and Utility staff to contribute funding for the development of the GIS system.

Quick roll out of a useful product.

The implementation of ITS technology will be a key factor driving the use of GIS-T.

For a transportation agency to utilize a GIS there must be a GIS analyst with transportation experience working for that agency.

Build custom applications for staff.

Provide sufficient resources including full-time staff.

Standarized street base map that is updated frequently; centralized data files.

Must be geared to transportation applications.

A robust GIS data model that can adequately portray the functional requirements of a transportation network.

MPO

Buy-in and understanding of benefits by management and funding agencies.

Provide adequate staffing levels, and funding, proper hardware and software.

Collaboration and cooperation among agencies, pooling of resources.

Availability of good and accurate GIS layers for the region.

Continued support from state Dept. of Transportation in Travel Demand Modeling and transportation planning.

Availability of good data from partner agencies.

Knowledge level of GIS technicians.

Good data maintanence.

Transit

Full support from management.

A well-coordinated and accurate base map and data set with full knowledge of needs for various divisions like operations, planning, paratransit.

Regionally coordinated data development and maintenance.

Intra-agency user group to discuss GIS issues and goals.

Knowledge of applicability for various departments.

Update and maintain hardware, software and data frequently.

A good understanding of what GIS capabilities exist and the development of interdependent relationships with other agencies (such as planning agencies and MPO's) so that data may be shared.

GIS staff must have buy-in from information systems staff.

Data interoperability.